

Dear readers and visitors at the IWG!

Welcome to the Innovation Centre Wiesenbusch Gladbeck (IWG)! At the IWG we now provide the opportunity to inform you about new applications for the use of energy, which, as we are convinced, will see an enormous dissemination worldwide within this century.

Already before the initiation of this centre and Europe's largest heat pump facility, in contracting with ELE, we decided to use the prospects of these systems and make them our mutual theme.

More than eight years ago started the practice-oriented training of qualified employees for environmentally friendly power engineering - so called "solarteurs"/german: "Solarteure", here at the HBZ of the Chamber of Crafts Münster, supported by the University of Applied Sciences/ Gelsenkirchen.



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FORUM FOR FUTURE ENERGIES IN THE EMSCHER - LIPPE - REGION

> At the same time, through the inalienable unity in joint efforts of leading associate partners among the industry (Buderus heating technology, Klingenburg and Vaillant), a demonstration pilot plant for different energy systems was created, as it is unique in Europe. The essential "online" efficiency supervision of the operated systems as well as the technical support is realized by the EEM Institute, a spin-off of the university of applied sciences/ Gelsenkirchen, which is also based at the IWG.

The development of innovative system solutions is focused on the aim to lower the system costs and/ or expand their functions. Their distribution into the market makes new, customer oriented forms of financing - linked with ranges of services necessary. The solar and DEC - system at the IWG were implemented in partnership with the market leaders Stiebel-Eltron and Klingenburg, and are a novelty in Germany. The foundation of an institute for the promotion of technological transfer - in the first instance with Morocco - at the IWG is intended by Mr. Moulay Radi El Harrak. Further forward-looking, new systems have been stipulated with the power provider ELE, the University of applied sciences in Gelsenkirchen and the GEA Happel company. So it will remain exciting at the IWG.

We wish you a nice, informative day at the IWG in the energy-city of Gladbeck, one that you will always remember gladly!

Juergen Buschmeier
CEO IWG

Joerg Koeppen
CEO IWG



Innovationszentrum Wiesenbusch Gladbeck
Betriebsgesellschaft mbH



IWG INFO 1/2005

Kompetenzzentrum für Solarthermie
und Wärmepumpentechnik



ENERGY SPECIAL

- A - Demonstration pilot plant station (Buderus Heiztechnik, Klingenburg, StiebelEltron, Vaillant)
- B - Field of collectors for photovoltaics (Harpen Renewable Energies)
- C - Pilot plant with micro-gas turbine (Technical College GE)
- D - Heat recovery (GEA Happel)
- E - DEC - system (Klingenburg)
- F - Ice storage tank
- G - Heat pump - and absorption cooler in the basement
- H - Field of solar-thermic collectors (Stiebel Eltron)
- I - Earth probes
- J - Pool absorber
- K - Photovoltaics (pilot instellation)



GREETING BY ULRICH ROLAND, MAYOR OF GLADBECK

„New Energies“ are a central issue for business- and structure development in the Emscher-Lippe- region, and in particular for the Gladbeck location. The innovation centre Wiesenbusch is hereby the place, where a large amount of innovative and intelligent solutions for hot water generation as well as for the heating and cooling of buildings were developed and can be visited today while operating.

Based on a close collaboration between the energy institute of the University of applied sciences in Gelsenkirchen (Prof. Dr. Rainer Braun), the institute for the management of energy efficiency (EEM) at the Innovati-

on Centre Wiesenbusch, the association for renewable energies and energy saving techniques (VEE) and its operating company, the IWG developed into a centre for demonstration and operation, with which Germany's leading producing companies in this segment are gladly cooperating.

Which projects and collaborations this concerns in particular, the on hand brochure, which is already published in the second edition due to the great interest, aims to convey to you. Since the compilation of the first edition in 2003 one more example for modern power generation, the micro gas turbine, has been added to

the range of offers by the IWG, with the support of regional power supplier ELE (Emscher Lippe Energy) and the city of Gladbeck.

Furthermore the city of Gladbeck and the government of North Rhine-Westphalia support the subject-matter in new energies also by creating new industrial real estate in the surroundings of the Innovation Centre, in order to provide it in particular to companies related to this exiting future topic.

Together with the region and lead-managed by the university of applied sciences/ Gelsenkirchen the Innovation Centre Wiesen-

busch is additionally working on a concept to help improve the export chances for energy system technology on the basis of renewable energies, for example into countries surrounding the Mediterranean.

I wish you an exiting reading and ensure you, that it will be worth visiting the Energy Centre of the IWG every once in a while, for we will implement lots of interesting projects yet here in the next years, together with the regional support.

Ulrich Roland

COLD FROM HEAT - ECO FRIENDLY ICE AGE

An extensive project, headed "Cold from Heat" and funded by WestLB Foundation "Zukunft NRW", is carried out by EnergyInstitute of University of Applied Sciences Gelsenkirchen, the director of which is Prof. Dr. Rainer Braun, by Kompetenzzentrum für Solarthermie und Wärmepumpen Technologie NRW, and by Institute of Energy-Efficiency-Management EEM GmbH, which has been founded in 1999 as a university's spin-off.

Technology

A liquid refrigerant - here: ammonia - is evaporated at low temperature by transferring heat which is supplied from an object which has to be chilled. This is the cold production covering a refrigeration load. The vapour is absorbed afterwards by a liquid absorbent, here: water, and for that reason the refrigeration is marked as sorption type refrigeration. To run a continuous process means that the refrigerant previously has to be desorbed from the ammonia-water solution and condensed. To run the condensation and absorption processes, waste heat has to be transferred to the ambient, Fig. 1,

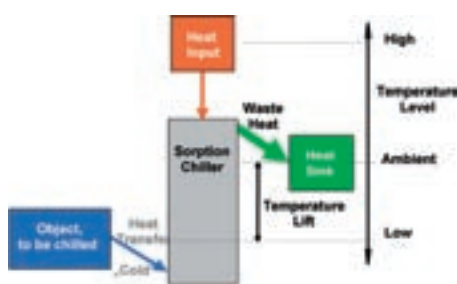


Fig 1. Sorption Refrigeration Technology

Future demand

There is a world-wide and rising demand for cold: for industrial processes, for comfort cooling, and for cold storage of food.

Sorption refrigeration is a particularly important method for preserving food in decentralised cold storage depots, because about 50% of agricultural products and fish are spoiled in the sun belt of the earth due to the lack of refrigeration. Compared with conventional refrigeration technologies, the heat driven sorption technology is very attractive as it can substitute electrical energy.

Driven by solar thermal energy or by waste heat alternatively, e.g. by heat from combined heat and power systems fired by renewable biogas, sorption refrigeration allows for substituting scarce fossil fuels. Hence solutions which will allow for cooling down to

0 °C and lower with cooling capacities smaller than 100 kW are needed. But until recently, suitable technologies which economically meet the demand, were not available.

Going on R&D project

A solar cooling system, as ammonia/water- absorption system which is supported by a mechanically driven solution pump and which operates on small capacity loads, has been designed and evaluated at IWG in Gladbeck. The finding is, that for decentralised solutions cold production from heat can be marketable and competitive. A now following project that is carried out in collaboration with EEM and the Energy-Institute has two objectives:

first,

to design a demand meeting, cost reduced ammonia/water-system which operates for a 25 kW refrigeration load and allows to cool

down to 0 °C and lower, this should prepare an entrepreneurial activity at the location Gladbeck

second,

to work out model applications "cold from heat", like a solar driven sorption refrigeration system for a cold storage depot in Marrakech Morocco, or like a local energy system with micro-gas-turbine and sorption refrigeration, or like a process cooling using waste heat from a bakery for the dough production.



Fig. 2
Ice storage, 170 kWh
capacity, IWG Gladbeck

140 % MORE ELECTRICAL CURRENT FROM THE SUN

The prototype plant as a remarkable private initiative from Dr. Joachim Zimmermann from Gladbeck has its location consequently at the IWG site.

At the IWG I have met an ideal terrain for my research on ways to double the electrical current yield by means of a reasonable solar module standing.

The conditions leading to the target are

- a.) *the mirror reflexion which doubles the concentration of the sunlight radiation*
- b.) *the two axis following the course of the sun to take full advantage of the direct radiation portion.*

One module is surrounded by maximum of six mirrors with the same size as the modules have. These mirrors catch the direct radiation like the module does but pass it on to them as a reflective kind, which causes a degradation. Although both a (concentration doubling) and b (direct radiation reception) enhance the yield of energy in proportion

to the light intensity, the electrical current and the warmness/coldness as well by 140% compared to the customary fixed mounted devices.

The existing device built in 2002 disposing of two mirrors per module has brought a yield increase of 65%.

The technological key for the process realization is the solution of the cooling problem. The two solar energy conversion routes, the current route and the warmness/coldness route are encountering at that process step. Whilst the warmness/coldness regime is moving within its energetic range, the warmness as a by-product along with the photovoltaic current generation and arising on an energetic level must be removed as waste because of the negative temperature coefficient of the said current.

For this purpose a stream of air depending upon the sun light intensity and self-controlled by this intensity at that has been developed for the waste warmth removal.

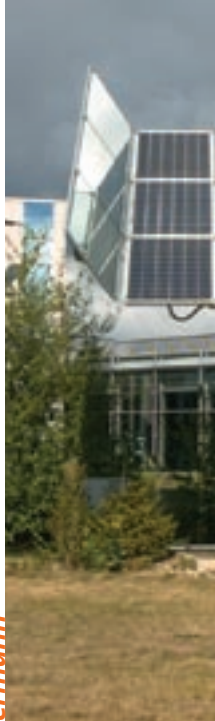
Beyond that regulations for the construction of solar power plants were founded, depending only upon the geometrical data of the modules chosen. As above these regulations are applicable for current generation and warmness/coldness as well.

An electrical current power plant for example designed for 100.000 kWh/a can be built with a specific plot demand of 17 kWh/m².

Besides the statistics according to the regulations the plant concept disposes of an electronic wind security precaution, which puts the modules into a horizontal position during strong winds.

The electrical and the electronic part of the project have been responsibly arranged by P. Beuge, FH Gelsenkirchen. He has also developed the suncourse following controlled by the light intensity.

Dr. Joachim Zimmermann



ENERGY FOR LIFE

ELE-Emscher Lippe Energy Ltd.Co.

The connection between the ELE Emscher Lippe Energy Ltd. Company as the regional energy partner and the Innovation Centre Wiesenbusch is nearly inevitable.

After all energy has always been one of the central topics of innovation. Therefore also the predecessors' companies of ELE belong to the "obstetricians" of the IWG.

It is important and just right, that the subject matter of innovation is at home

in all regions. But especially the Emscher-Lippe area has been an energy region for a long time, even though in the past upon complete different terms than today. The ELE contributes its part, so that our region continues to be "energyland".

The IWG is one of the first addresses for this: with new applications for solar energy, the heat pump and many other great ideas. But those kinds of ideas do not only need a home, they also need a platform, in order

to be presented to a larger public audience. That is why events such as e.g. the annual heat pump exhibition are an important signal at the location IWG and also for the city of Gladbeck.

The ELE - team with its CEO Dr. Rainer von Courbière wants to and will take care of this in the future as well: Not only at the IWG but also as partner in terms of energy for clients in Gladbeck, Bottrop and Gelsenkirchen, with a good service

and favourable offers provided, close to the region and its people, and last but not least with the ELE Card, which is already used by over 100.000 clients.



Hermann Grewer
Chairman regional group
IHK North Westphalia,
Gelsenkirchen



Hermann Grewer

ENERGY NEEDS RELIABLE BASIC PARAMETERS

The political conditions and basic parameters will be decisive for the companies in the future. Obligatory shares of renewable energies the power supply are to be refused as well as permanent subsidies for individual energy sources. Research and development in the energy sector must become an essential part of grant-aided advancement policy. Therewith the complexity of all of technology's options is spread out, which then can prove themselves on the market in a practical test when having to persist in terms of new products, for private end customers as well as for commercial and industrial users.

Yet with all euphoria may not be overlooked, that the productive efficiency of the economy also depends on a

secure and above all budget-priced energy supply, which is produced in different ways today than it has been ten years ago.

Power, for example, does not just come out of the socket outlet. The Industry-electricity tariffs are now (2004) around 18% below the level of 1998. They could even be another 30% cheaper than around the time of the liberalisation of the energy market, if special political burdens such as the power tax or the additional costs linked to the Renewable Energy Sources Act had not affected the prices to rise.

Crucial for the future will be the safety of energy, the improvement of energy efficiency and the mix of ener-

gy for competitively priced conditions. Regarding this fact, nobody in this country will neither want to nor be able to set aside conventional power generation completely.

According to the estimations of the energy industry power plants with a total operating performance of 40 000 megawatt will have to be replaced, due to old-age. That equals an investment of 30-40 billions of Euro until the year 2020. Whereas brown- and hard coal generating plants are basically as important as nuclear energy. Apart from modern power plant engineering also renewable energies are a focal theme in the Emscher-Lippe Region. Renewable Ener-

gies can make an increasing contribution to the future, to achieve climate protection goals and above all to meet the energy demand, that is increasing steadily worldwide. Technical innovations from the energy region Emscher-Lippe could thereby become prosperous export products/ export sensations.

The Innovation Centre Wiesenbusch has focused on "Solarthermie" and heat pump technology. Economy and Science, company and university are collaborating, team up and get involved with it in an exemplary way.

Hermann Grewer

THE EMSCHER-LIPPE ENERGY REGION: COMPETENCE CENTER FOR FUTURE ENERGIES

Embarking on new growth paths with future energies.

Hard coal mining operations gave the Emscher-Lippe region globally recognized technical competence in the recovery of coal and in energy generation and distribution. And even though this region, formerly dominated by heavy industry, has long since undergone a metamorphosis, expertise in energy issues has remained.

Today efficient transformation and use of energy and technologies to utilize renewable energies top the agenda. The major goal is to establish the region's reputation as a competence center for the energies of tomorrow and to expand capabilities to become one of the leading European

venues for modern energy technologies. Numerous projects were launched beginning in the 1990s, in the framework of an "Emscher-Lippe Energy Region" campaign. Today the photovoltaic modules factory, the "Blue Tower" biogas generator, solar refrigeration and HyChain reflect the newly acquired know-how in this region. Settling near these and a number of other energy projects, the technology centers – the Gelsenkirchen Science Park, the Wiesenbusch Gladbeck Innovation Center and the Herten Future-Center – have established themselves as focal points for the further development of future energies. The companies and agencies located there demonstrate forward-looking energy technolo-

gies in real-world applications. With the Gelsenkirchen University of Applied Sciences and its attached Energy Institute, the Fraunhofer Institute for Solar Energy Systems and the "ef. Ruhr" energy research establishment the region boasts three facilities which provide significant impetus to increasing the region's competitive position.

In implementing much-needed structural change the Emscher-Lippe region has gained new innovative power. Future energies build upon the region's traditional strengths and even today make a measurable contribution to the creation of new jobs. The region's capabilities and advantages are found in not concentrating on a single energy source

but especially in the creation of an innovative energy mix which systematically links "classical" and "new" energy technologies one with another.

To support the accumulation of expertise in the field of future energies a regional branch of the Futures Energy NRW state initiative has been set up at WiN Emscher-Lippe. Its purpose is to draw together and reinforce regional activities. Current major interests include establishing a competence network, supporting cooperative projects, staging the recurring "megaWatt" future energies forum and conducting regional events on specific subjects of interest.

www.energieregion-el.de



NEW STANDARDS IN "SOLAR ARCHITECTURE"



Future-oriented architecturally perfectly integrated energy recovery with RHEINZINK® roof and facade systems

For years the use of regenerative energy has made a practical contribution to covering our energy requirements in both ecological and economical terms. However, potential customers often shied away from such systems as until now, their appearance left something to be desired. RHEINZINK® solar

solutions stand for a stylish appearance, architectural integrity, durability and a high level of efficiency.

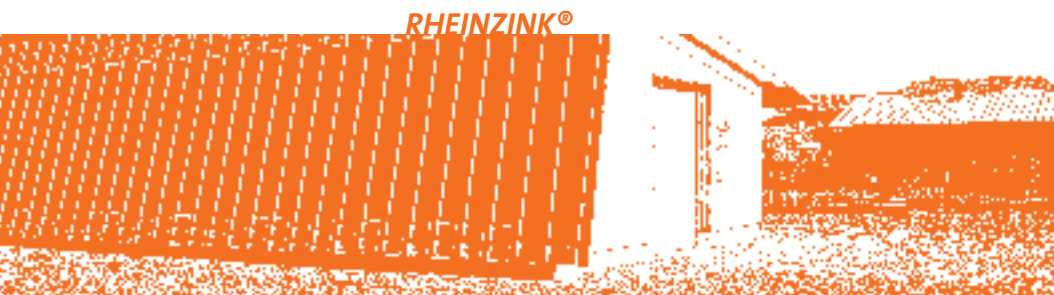
The products from the RHEINZINK®-Solar PV series operate on the photovoltaic principle, directly converting sunlight into electrical energy. Here preprofiled RHEINZINK® metal roof sections are entirely covered with high-performance solar modules. The sections can be installed on roofs and

facades without additional fastening elements using the tried and tested QUICK STEP® roofing-system technology or classical seaming techniques (double/angled standing seam roofsystems, Click-Strip roofsystem).

QUICK STEP®-SolarThermie is an invisible collector solution for the recovery of thermal energy that is quite unique. The basic profiles are modified with a fluid system on the underside which allow

ambient heat to be absorbed, even when the weather is cloudy or in winter, and then transferred to heating and building services systems.

With RHEINZINK® it is possible to create high-quality solar solutions integrated in roofs and facades which blend in with the surrounding architecture to optimum effect.



Here preprofiled RHEINZINK® metal roof sections are entirely covered with high-performance solar modules.

CHAMBER OF CRAFTS MÜNSTER SUPPORTS THE USE OF REGENERATIVE ENERGIES



Hans Rath

The application possibilities of regenerative energies are manifold. They contribute an important stake in the reduction of CO² emissions. A positive side effect besides these important environment protection goals is the fact, that with the regenerative energies many new jobs have been provided and secured. Especially against the background of the structural transformation in the construction and extension industry regenerative energies give lots of positive impetus for new fields of employment.

German crafts also achieve the aim, to reduce the CO² emission in Germany noticeably. The range of its offers includes the supply and use of innovative energy technologies, skilled advice and

information for the clients and an optimal on site service of the installed systems.

One main focus of technical activity in the energy sector is set on the heating of buildings and the hot water generation, as exemplified at the IWG. The saving of energy can be put into practice, particularly with existing technology and an available asset of premises.

Economically advantageous heating systems, the use of solar and biomass energy and the ongoing extension of the combined heat and power cycle are examples for the effect taken by trade and craft companies in order to achieve a decrease of the total primary energy supply until the

year 2010. The decentralisation of the energy production meets the services offered by trade in many ways. Besides the ancestral markets new chances for crafts arise also in many services sectors. Regarding the energy contracting the heating installer in co-operation with partners becomes service provider. The service provider rents the central heating room, installs the heat generator and sells the product heat to the user.

The construction and cultivation of a building has always been a special focal point of competence to the crafts. The concentration upon an improvement of premises on stock offers a great potential of activities, that are economical-

ly and ecologically most reasonable. The trade will rise to these future challenges and thereby will continue to strengthen the use of regenerative energies.

Hans Rath
Chairman Chamber of Crafts, Münster



USE OF MINE GAS AT THE COMPOUND OF THE FORMER COAL-MINE "NORDSTERN" IN GELSENKIRCHEN THROUGH THE THS



In December 2003 the Treu-HandStelle limited company (Ltd.) put the former building of the coal-mine "Nordstern" in Gelsenkirchen into operation, as the new head office of the THS group of companies. Part of the special challenges regarding the technical engineering throughout the construction phase was the dealing with existing mine gas on-site.

The problem of gas emission from filled shafts and the measures of gas protection was solved brilliantly by the architects and engineers of the THS and commissioned companies. An alternative, patented method of gas protection resulted finally from an ad hoc specially developed innovative security concept. At the same time the subsequent

use of these firedamps was examined. Experiments with the extraction by suction in 1999 arose the fact, that mine gas is an utilisable energy device at a pure methane flow of rd. 100 m³/h. Hereupon the THS acquired the "mining rights".

The controlled ascending mine gas is now collected and compressed by the THS in a specific station within the new administrative building, and from here can be supplied to a block-type thermal power station at the Emscher-Lippe-Energy Ltd. (ELE) from here. The block-type thermal power station is also located at the former coal-mine site. The engine was a priori designed for several types of gas and can be run with

mine gas as well as natural gas. A commingling of both gas types is also possible, in order to adjust imbalances of mine gas volume by adding natural gas.

The current law situation is still awaiting a little change yet, towards the admixture of natural gas and therefore with an optimised energy recovery. The technically trouble-free and ecologically reasonable admixture is not operated at present, as the energy produced at the block heat and power plant is only then supported, if it can be decomposed without the addition of natural gas. This still leads to the fact on many days of the year, that the THS has to blow off the prior tediously collected and compressed gas into the air right away, as due to

the fluctuation of concentration the combined heat and power unit falls short of the required value on these days.

The use of mine gas as described above shows the commitment of the THS in the field of regenerative energies. At the same time, the THS is also founder member of the registered association for the advancement for renewable energies and energy conservation techniques (VEE), which is also located at the IWG in Gladbeck.

TECHNICS TO FEEL GOOD

To use heat that derives from the earth means to fuel favourably priced and environmentally sound

That earth's core is many thousand degrees hot, has been well-known to human beings for many years. But that already five to ten meters below the earth's surface a temperature of about +10 degrees Celsius prevails – irrespective of the season – hardly anybody knows. This available source of heat energy can be used favourably priced with heat pumps from STIEBEL ELTRON, to raise the temperature of your home up to comfortable degree levels.

Not only air or water are available energy sources for heat pumps, also with the heat from the deep high costs for a home heating system with expensive fossil fuels such as gas or oil

can be reduced. By means of thermophotovoltaic devices on the ground or geothermic probes the consumer has the possibility to gain free energy from the environment. The idea of the environmentally friendly use of this environments warmth is nothing new. Already 25 years ago people in Germany started to heat houses with the heat from the deep of the earth. Initially that was done solely through horizontally laid ground collectors, that took up a lot of space in the garden. Today, a quarter century later, an innovative and at the same time simple method was developed, to make space-saving and low-priced use of the heat from the deep.

In the home garden specific drills break up to 100 meters deep into the soil. The probes, embedded

through the drilled holes, transfer the warmth to the heat pump, installed in the house. And that ensures, that even on the coldest winter days, a comfortable temperature spreads all over the house and the whole family feels good.

Like that, for example, works the new heat pump generation "WPF" from STIEBEL ELTRON, in single occupancy or semi-detached houses, low-priced and environmentally friendly. The compact unit for two heat sources can be operated as well with a soil heat probe, a ground collector, or a fountain-/ water plant.

Whether for the heating of rooms or as well for the hot water generation, the new WPF- line provides a reliably and exceedingly quiet way of favourably priced heat and low energy consump-

STIEBEL ELTRON



STIEBEL ELTRON

tion. It is qualified for the installation in the basement, but even finds enough space in the hobby- or utility room. And there are no disturbing running noises. As more and more landlords continuously rethink and warm up in the privacy of their home with a heat pump, the environmentally friendly heating system from the seventies experiences a renaissance. Thus

New heat pump „WPF“ with integrated adjustment control

MODERNISED HEATING PUMPS FROM THE VISSMANN COMPANY WARMTH COMING FROM THE EARTH, WATER OR AIR



VISSMANN
more than heat

Warmth is nearly everywhere: In the air and in the earth, as also in the groundwater. The builders and modernising owners can use this kind of energy with heating pumps, for example with the new Vitocal 350 from the Viessmann Company. This pump gets a previous temperature about 65° Celsius and so that it can be combined with the available radiators. The fact that the old radiators can still be used after the change leads to lower costs, less work and dirt.

Even at cold outdoor temperatures about 14° Celsius below 0 the Vitocal 350 can

achieve the necessary previous temperatures for the heating. Due to this fact the reliable pump can be used all year without any additional heat generator. The water

for the heating gets up to 65° and the water for drinking up to 58° Celsius. The pump is very faint while its working and achieves a power between 9,4 and 15,0 kW.



- A Source of warmth from air
- B Source of warmth from groundwater
- C 1 Source of warmth from earth (probe)
- C 2 Source of warmth from earth (Ground Heat Exchanger)

It's ideal for the modernisation: The heating pump Vitocal 350 uses regenerative energy. It gets up to 65° Celsius in the previous temperature and therefore it can be combined with the necessary available radiators. The fact that the old radiators can still be used after the change leads to lower costs, less work and dirt.



NIBE System Technology Ltd.Co. is also exhibition partner of the IWG.

UP TO 75% HEAT ENERGY TAPPED OUT OF NATURE

Constant regeneration through sun, rain and snowmelt

Heat pump heating:

A modern NIBE heat pump heating taps the required energy for the heating of buildings and domestic water from the soil. Only about 25% have to be expended for the driving power of the heat pump and thus paid.



Laying of a space-saving NIBE compact absorber as effective energy source in the garden

NIBE Systemtechnik GmbH

Compact absorber as heat source:

In order to keep the investment costs within a limit, the company NIBE system technology offers a compact absorber as heat source, which is run subterranean of the earth's soil a very high reduction of operational costs can be achieved using this absorber. The factory-made absorber comes fully equipped and therefore additionally cuts the installation costs to a great extent.

All-season solar heating:

As the underground ("earth"-) storage (absorber) regenerates itself continuously through sun radiation,

rain water and snowmelt, this way of heating presently stands in the forefront in terms of being environmentally friendly and low-priced in operational costs. That is why it is also called "all-season solar heating".

Heat recovery with storage function:

Integral system technologies, that meet all important needs such as heating, domestic water heating and air conditioning, are increasingly in demand, as they offer the user a raised standard of habitation comfort.

Compact-systems by NIBE combine therefore as well the controlled air conditioning with an exhaust air

module and effective heat recovery. The heat detracted from the exhaust air is transferred to the earth storage (absorber) and thus arises the temperature of the heat source. The impact degree throughout the year is thereby improved considerably.

Active protection of the environment:

Heat pumps do not only operate economically advantageous, they also offer to make a contribution to environmentalism. Compared to oil heating, for example, the CO² emission is lowered by over 50%.

